CLAIMS

What is claimed is:

1. A method for subcarrier allocation and loading for a multi-carrier, multi-subscriber system, comprising:

associating at least one cluster in a first set of clusters of subcarriers for use in communication with a first subscriber;

associating at least one cluster in a second set of clusters of subcarriers for use in communication with a second subscriber;

for each cluster associated for use in communication with the first subscriber and the second subscriber, multiplexing a usage of said each cluster between the first subscriber during a first time division and the second subscriber during a second time division.

2. The method of claim 1, wherein multiplexing includes assigning said each cluster to a one of the first subscriber and the second subscriber that has a highest transmission rate of transmission rates of subscribers associated with said each cluster.

3. The method of claim 2, wherein the transmission rates are weighted.

4. The method of claim 3, wherein each one of the transmission rates is weighted based on a proportion of time that a subscriber has transmitted on said each cluster.

5. The method of claim 1, wherein multiplexing includes periodically reassigning said each cluster to a one of the first subscriber and the second subscriber.

6. The method of claim 1, wherein multiplexing includes assigning said each cluster to a one of the first subscriber and the second subscriber based on a probability that the cluster will be used by the first subscriber and a probability that the cluster will be used by the second subscriber.

7. The method of claim 1, wherein associating at least one cluster in the first set for use in communication with the first subscriber includes selecting the at least one cluster based on a SINR and a traffic load of each one of the at least one cluster.

8. The method of claim 7, wherein the traffic load of each one of the at least one cluster is a queue fullness of a queue associated with that one of the at least one cluster.

9. The method of claim 7, wherein selecting the at least one cluster based on a SINR and a traffic load of each one of the at least one cluster includes balancing lengths of queues associated with each one of the at least one cluster.

10. The method of claim 1, wherein multiplexing includes assigning said each cluster to a one of the first subscriber and the second subscriber based on a quality of service requirement of the first subscriber and a quality of service requirement of the second subscriber.

11. The method of claim 10, wherein assigning includes allocating said each cluster to a one of the first subscriber and the second subscriber having a lower quality of service requirement than that had by another one of the first subscriber and the second subscriber during periods of time in which a one of the first subscriber and the second subscriber having a higher quality of service requirement than that had by another one of the first subscriber and the second subscriber does not transmit on said each cluster.

12. The method of claim 1, wherein associating at least one cluster in the first set for use in communication with the first subscriber includes selecting the at least one cluster based on a bandwidth requirement of the first subscriber.

13. The method of claim 1, wherein associating at least one cluster in the first set for use in communication with the first subscriber includes selecting a subset of the first set having a least instantaneous delay ratio for the first subscriber of any instantaneous delay ratio for the first subscriber of any subset of the first set.

14. The method of claim 1, wherein associating at least one cluster in the first set for use in communication with the first subscriber includes selecting a subset of the first set having a least statistical delay ratio for the first subscriber of any statistical delay ratio for the first subscriber of any subset of the first set.

15. The method of claim 1, wherein multiplexing includes:

loading data associated with the first subscriber into a queue associated with said each cluster upon determining that a data packet is present in a queue associated with the first subscriber; and

loading data associated with the second subscriber into the queue associated with said each cluster upon determining that a data packet is present in a queue associated with the second subscriber.

16. The method of claim 15, wherein loading data associated with the first subscriber and loading data associated with the second subscriber includes loading the data associated with a one of the first subscriber and the second subscriber having a higher average transmission rate than that had by another

one of the first subscriber and the second subscriber before loading the data associated with a one of the first subscriber and the second subscriber having a lower average transmission rate than that had by another one of the first subscriber and the second subscriber.

17. The method of claim 16, wherein the average transmission rate of the first subscriber and the average transmission rate of the second subscriber are weighted.

18. The method of claim 16, wherein the average transmission rate of the first subscriber is weighted based on a proportion of time that the first subscriber has transmitted on said each cluster and the average transmission rate of the second subscriber is weighted based on a proportion of time that the second subscriber has transmitted on said each cluster.

19. The method of claim 15, wherein loading data associated with the first subscriber and loading data associated with the second subscriber includes loading the data associated with a one of the first subscriber and the second subscriber having a higher quality of service requirement than that had by another one of the first subscriber and the second subscriber before loading the data associated with a one of the first subscriber and the second subscriber

having a lower quality of service requirement than that had by another one of the first subscriber and the second subscriber.

20. The method of claim 15, wherein loading data associated with the first subscriber into the queue associated with said each cluster includes loading data into a segment of the queue having a lowest delay of any delay of any segment of the queue.

21. The method of claim 20, wherein loading data associated with the first subscriber into the queue associated with said each cluster includes loading data into a segment of the queue having a smallest cluster index of any cluster index of any segment of the queue.

22. The method of claim 15, wherein loading data associated with the first subscriber into a queue associated with said each cluster includes preempting a loading of data associated with a third subscriber into the queue upon determining that the data associated with the first subscriber has a higher quality of service requirement than that had by the data associated with the third subscriber.

23. The method of claim 15, wherein loading data associated with the first subscriber includes loading data having a highest quality of service requirement

of any data associated with the first subscriber before loading other data associated with the first subscriber.

24. The method of claim 1, wherein multiplexing includes informing the first subscriber of a first time division multiplexing index, corresponding to the first subscriber, for said each cluster, during an allocation phase.

25. The method of claim 1, wherein multiplexing includes embedding a time division multiplexing index, corresponding to the first subscriber, in a segment of said each cluster intended for the first subscriber.

26. The method of claim 25, wherein the time division multiplexing index corresponding to the first subscriber varies between different ones of the clusters.

27. The method of claim 25, wherein embedding the time division multiplexing index includes encoding the time division multiplexing index.

28. The method of claim 1, wherein multiplexing includes transmitting, with data intended for the first subscriber that has been loaded into a segment of said each cluster, a preamble for the segment that includes a time division multiplexing index, corresponding to the first subscriber, for said each cluster.

29. The method of claim 28, further comprising:

the first subscriber receiving the data intended for the first subscriber, with the preamble; and

upon the first subscriber recognizing the time division multiplexing index included in the preamble as matching a time division multiplexing index received by the first subscriber during an allocation phase, the first subscriber decoding the data and passing the data to an upper layer.

30. The method of claim 1, wherein multiplexing includes scrambling data, intended for the first subscriber, using a scrambling sequence corresponding to a time division multiplexing index, corresponding to the first subscriber, for said each cluster.

31. The method of claim 30, further comprising:

the first subscriber receiving the data intended for the first subscriber; and

upon the first subscriber successfully descrambling the data using the scrambling sequence corresponding to a time division multiplexing index received by the first subscriber during an allocation phase, the first subscriber decoding the data and passing the data to an upper layer.

32. A base station, comprising:

user data queues to store data transmitted from subscribers;

multiplexing logic coupled with the user data queues to receive feedback information from subscribers, to allocate, based on the feedback information, one or more clusters of subcarriers to each subscriber, and to time division multiplex data from the user data queues into cluster data queues corresponding to those of the clusters allocated to more than one subscriber; and

the cluster data queues coupled with the multiplexing logic to receive data from the multiplexing logic and store the data for transmission on corresponding clusters of subcarriers.